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ABSTRACT

The influence of situational expectations, conditioned by previous experience, on the interpretation of entire prose passages was investigated with 22 hearing and 18 hearing impaired adolescents. The ambiguous paragraph model was borrowed from D. Schallert and two separate paragraphs were constructed. Ten multiple choice questions were generated for each ambiguous paragraph. Each question had two possible correct answers, one for each of the two primary interpretations. Two distractor items were written, one for each of the two interpretations. The primary interpretation reponses and distractors were then randomly ordered for each test item. Ss were instructed to read the first paragraph, answer the questions and then proceed directly to the second paragraph. It was concluded from results that differential reading abilities of adults, as well as children, may not be due to linguistic differences but to the fact that a lifetime of different or incomplete experiences has not prepared them to organize the world in an optimal fashion. (SBH)

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THE EFFECT OF EXPERIENCE ON THE DISCOURSE COMPREHENSION OF DEAF AND HEARING ADOLESCENTS

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Introduction

A classic view of language is that it consists of discrete levels that are relatively impenetrable (de Saussure, 1966). This concept is still a tenet of the transformationalists who have only shifted their emphasis to syntax. While they regard syntax in varying degrees of awe as the underlying principle in language, they still maintain a fixed notion of levels of language in their descriptions of base rules, transformational rules and morphophonemic rules. This concept of the levels of language provides a useful starting point for a psycholinguistic model of comprehension. To interpret the verbal code, the reader must make reference to a set of meanings for discrete verbal items, hence semantics or a lexicon is an initial starting point for a model of comprehension. In order to be intelligible, meanings must be ordered and relationships expressed, thus grammar, including syntax and morphology, must be applied as another layer of the model. A problem arises at this point for clearly not all sentences are the simple sum of their parts. Further, there is the problem of how meanings are extended across sentence boundaries to make subsequent parts of the message interpretable.

One approach to this issue of prose interpretation is what Frederiksen (1977) calls "text-based" studies of discourse comprehension. The procedure depends on the

observation that certain grammatical features link successive sentences together by requiring reference to earlier information. The text-based methods which follow "integrative" theories of text comprehension, attempt to account for prose interpretation completely within the confines of the material provided. While this approach has been useful in increasing our knowledge of how much material is actually carried by the verbal code, it is unable to account for a variety of linguistic phenomena. One very interesting paradox regards the relative ability of one individual to interpret the unfinished sentence of another person. A brief example will illustrate this point. Unfamiliar with a bus route but realizing that she has missed her stop, a frantic passenger rushes up to the bus driver and asks, "How much farther to the next stop?" The bus driver mumbles an unintelligible reply. The passenger makes a subjective interpretation and responds, "Oh, a lot." The bus driver, now annoyed at the nervous passenger, retorts, "No, I said a block." What has happened in this fairly common and quite simple illustration is that the passenger had constructed two possible responses for the driver, each predicated on her own ignorance of the geographic area. She anticipated a response of either "not much" or "a lot" since her question did not necessarily require a measurement of specific distance. Therefore, within the noisy confines of the bus, the passenger reconstructed the prominent available

acoustic features of the driver's utterance to form an interpretation that fit her expectations of the situation. Once such expectations are formed a third component of a comprehension model requires some system for constructing or applying structures of interpretation. These "schema" can be understood as collections of attributes assignable to single words or constructs (Winograd, 1977) or can be thought of as whole fabrics or "scaffoldings" for supporting discourse interpretations (Anderson, Spiro and Anderson, 1978) or collections of transient macro-semantic structures (Van Dijk 1977) that operate much like certain rules of syntax as Chafe (1972) had earlier suggested.

Shimmerlik (1978) in a very extensive review of the literature pointed out that the concept of active memory organization is not new. Further, Meyer (1975) outlined the history of the study of memory organization and its relationship to prose interpretation, pointing out that in order for a reader to interpret a passage some sort of organizing principle must be employed. The history of the research is replete with studies establishing the functioning of the individual's idiosyncratic system in the interpretation of a passage.

Two divergent theoretical bases for study have come out of studies of prose comprehension. The first proposes that a successful reader is an individual who can match his or her interpretation mechanism to that of the author. Paris and Mahoney (1974) studying cognitive integration in

seven to eleven year old children found that a general comprehension mechanism was at work that used all information available to an individual to construct a meaningful interpretation. Pace (1978) investigated the influence of world knowledge on children from grades 2 through 6 by defining "scripts" as knowledge about stereotypical events. Children who had adequate scripts were able to comprehend both explicit and implicit story forms. Meyer, Brandt and Bluth (1978) assumed that the young reader was more effective when his or her organizational structure matched that of the author's intent. They also found that better adolescent readers were more likely to use the author's schema.

Studies undertaken with an opposing theoretical viewpoint make a stronger argument for the influence of some kind of prior experience or conditioning factor on the interpretation of a passage. Schweller, Brewer and Dahl (1976) investigated the effects of conditioning memory for certain categories of sentences. They demonstrated that by conditioning the subject by means of a sentence that reflects either an intent on the part of the speaker or an effect on the hearer it was possible to convince the subject that nonidentical sentences were similar. They demonstrated that with previous content experience, the hearer can be oriented towards a specific construct.

Another level of information processing was investigated by Schallert (1976) who studied the amount of

information remembered and the semantic interpretation assigned to ambiguous paragraphs. She found that by conditioning a specific context prior to reading, it was possible to affect the interpretation of ambiguous materials. Sulin and Dooling (1974) investigated the intrusion of a thematic idea in prose retention. Passages containing a construct which the subjects could identify with were more readily retained than those without. Fredericksen (1975) experimented both with materials that induced individuals to draw inferences about the passages and with materials that did not. He found that a constructive model accurately described the processing of the subjects. Kurth and Moseley (1978) studying the effects of paraphrasing topic sentences on paragraph interpretation found that such a procedure improved comprehension. They suggest that such an activity helps the individual to construct an interpretive network for the material to be read.

Such research has included studies of the effects of the conditioning of certain words as well as certain classes of sentences. Koehler (1978) moved the studies to a new level by investigating the relationship between an unfamiliar word, its context, and content comprehension. He found that "minor" lexical ambiguity did not affect story comprehension but that story comprehension was influenced by the use of story summaries presented to subjects prior to reading the material.

A logical extension of the research would be to demonstrate how a particular life experience can account for differences in the interpretation of prose passages. Since it has been shown that relatively short term and simple effects such as pre-conditioning for word or sentence categories can effect interpretation, it was hypothesized that unique life experiences can also condition one's perceptions. Anderson, et al. (1977), for example, demonstrated that an individual's interpretation of a passage could be determined by their particular sex.

One aspect of this paper will study the influence of situational expectations, conditioned by previous experience, on the interpretation of entire prose passages. The theoretical basis for this study assumes an active role on the part of the reader or listener inthe construction of an interpretation of prose. This study sought to replicate the Anderson, et al. findings as well as introduce two additional life experience variables ethnicity and hearing loss. For the purpose of this study sex, as well as the other experiential variables were chosen as significant variables under the constraints of our society. The reader is undoubtedly familiar with the varying life experiences that differences in sex or race may produce in this country and with relatively little effort can likewise imagine many of the differences that a factor like profound hearing loss can produce.

Method

The ambiguous paragraph model was borrowed from Schallert (1976) and two separate paragraphs were constructed. Ten multiple choice questions were generated for each ambiguous paragraph. Each question had two possible correct answers, one for each of the two primary interpretations. Two distractor items were written, one for each of the two interpretations. The primary interpretation responses and distractors were then randomly ordered for each test item.

Small groups (N less than 12) were organized for administration of the nonspeeded tests. All subjects were allowed twenty minutes to read the paragraphs and answer the questions. This time allotment proved sufficiently generous for all students to complete all items. Directions for the test were presented to the hearing impaired subjects using simultaneous communication (a combination of spoken English and sign language). Subjects were instructed to read the first paragraph, answer the questions and then proceed directly to the second paragraph. Paragraphs were differentially ordered for presentation so that half of the students received the Foreigner/Deaf paragraph first while the other half first received the Music/Cards paragraph. Preliminary analyses indicated no significant differential effect for paragraph sequence.

Treatment

An ambiguous paragraph was taken from the Anderson, et al. (1977) study and modified to accomodate the lower level of syntactic processing of hearing impaired adolescents.

> Every Saturday night, four good friends meet at Karen's house. This Saturday night Karen was writing some notes. Jerry, Mike, and Pat arrived. Karen quickly picked up her sheets of paper. She went to the door to let her friends come in. Jerry, Mike and Pat followed Karen into the livingroom. As usual, they could not decide what to play. Finally, Jerry took a stand and set things up. Karen's recorder filled the room with soft and pleasant music. Mike noticed Pat's hand and the one large diamond. The tempo of the play increased as it got later and later. Finally, they stopped for a minute. Jerry looked at his arrangement. Mike suddenly said, "Let's hear the score." Everyone listened carefully and talked about their performance. They all decided to go home. After they finished talking, Karen's friends went home tired and happy.

This first paragraph is the Music/Cards paragraph from Anderson, et al. (1977) which is susceptible to an interpretation as a music rehearsal for a small chamber music group or as a friendly card game. Since the other paragraph used in the original Anderson study depends to a large extent on the ambiguity of "idiomatic" English expressions as well as an extensive use of the indefinite passive voice, it was not used. Several researchers have observed that hearing impaired children have a very difficult time with English passives and "idiomatic" expressions. Instead, a second paragraph was written at the appropriate syntactic level for the hearing impaired readers and which reflects (by one interpretation) an experience unique to them.

> Carlos thought the sign was clear. He still waited. Did he misunderstand the direction of the sign? A wrong move at this point would be a disaster. He would never learn why he came here. His slow response was bothering the people around him. Sometimes Carlos was confused by new signs. He tried not to show his confusion. Many signs came so fast that he could not follow them. One sign came now. He recognized the shape of the sign, but it was in a different position. He had to do something quick. He would be in trouble if he did nothing. The other people around him would be angry. He decided to do something. Carlos moved forward slowly and cautiously. The people around him were nervous. Did he make a mistake?

This second paragraph was written to be interpretable as a foreigner lost in a strange city or a deaf student learning how to use sign language. The second paragraph was categorized as the "Carlos" passage. In a pilot test, hearing adults interpreted the content of the Carlos paragraph to mean a foreigner lost in a strange city. Other adults who were learning sign language, however, interpreted the content as meaning a student confused by a new sign presented in class.

Sample

Twenty-two hearing adolescents were selected from two reading development classes in an average hearing secondary school in Maryland. Membership in the reading classes was determined on the basis of failure to achieve on grade level reading performance as defined by the Iowa Test of Basic Skills. Eighteen hearing-impaired adolescents were selected from the general population of a secondary school for the deaf on the East coast. These students would also be considered as "average" in the sense that no multiply-handicapped or educationally handicapped children were selected from the larger population. Reading scores for this sample were obtained from the Stanford Achievement Test - Hearing Impaired Version. The sex and ethnicity distribution for the two samples is presented below.

Table I

Sex and Ethnicity Distribution for the Two Samples

Degree of Hearing

	Hearing		Hearing Impaired	
	Male	Female	Male	Female
White	3	6	5	6
Black	9	5	4	3

Data Analysis

Each item on the ten item multiple choice tests following the paragraphs was susceptible to one of two primary responses. A cumulative score for each of the four possible interpretations related to the two paragraphs was calculated by summing the number of correct responses consistent with each interpretation. Four F-tests were conducted utilizing a Three-way Analysis of Variance. The analyses were made for each collection of raw scores representing the four possible paragraph interpretations. The three independent variables were hearing loss, sex, and race. The results are summarized below.

Table 2

Summary of Main Effects from four ANOVA F-Tests

Factor/Interpretation	Foreigner	Deaf	Music	Cards
Hearing Loss	signif. $p<.01$	signif. $p<.02$	n.s.	n.s.
Sex	n.s.	n.s.	n.s.	n.s.
Race	n.s.	n.s.	n.s.	n.s.

The complete source of variance tables and group means for the analyses are presented in Appendix 1. The only significant effect for any of the interpretations was that of hearing loss, which only produced a main effect for the Foreigner/Deaf treatment paragraph. The hearing sample produced significantly higher scores for the foreigner interpretation than the deaf sample ($p< .01$), while the deaf sample produced higher scores on the sign language interpretation ($p< .02$). There was a slight effect of sex on the music interpretation of the card/music paragraph with females showing slightly higher means (6.75) than males (4.9, $p <.10$). This result is very similar and in support of reported findings from Anderson, et al. (1977).

Discussion

Winograd (1977) remarks that if an individual used complete systems as a way of organizing discourse then the individual would have to hold in memory a large number of schema and contain them, by implication, as wholes. However, Winograd's argument assumes that the schema is a completed structure. A more economical model can be described if one first assumes that the primary structures are composed of subset structures each with their own probability and not whole systems, such that the probabilities are attached to separate lexical items. Several researchers (Van Dijk, 1977; Kintsch, 1977; Anderson, 1977) speak of the principles of comprehending discourse in terms like "expectations" and probabilities. What we are proposing is that one should take Winograd's concept of the schema as a basic building block but add some kind of probabilistic system or "fuzzy set" theory.

When an individual begins to process an extended piece of prose, a basic assumption or ground rule is established as Van Dijk (1977) delineates. The initial entry or entries provides a key or referencing item that is then attached to subsequent items and conditions the selection of alternate interpretations. When an individual encounters the initial or referencing item, a series of potential relationships is opened up. The set of potential relationships is functionally infinite since the number of possible items that can be predicated by the relationship

is quite large. Through subsequent additions, a particular interpretation is constructed. The schemata that Anderson describes is not what the individual contains in his head, but rather a document of the entire process. Using an analogy to transformational grammar, the interpretation is the final morphophonemic string that resembles real language. The schemata is the extensive tree diagram with applied rules that was used to generate that final string.

This view of the process of comprehension is much more economical than supposing that whole systems exist intact. The schemata does exist in the sense that it is recoverable and reproducible. Such a system is easily modified by subsequent learning. Whole nets need not be replaced but can be altered by either simple or drastic modification of the internal elements. Our terms such as comedy and tragedy may not be descriptions of constructs but generic categories for a variety of similar processes.

This type of an account can be used to understand the way that the two "Carlos" passage interpretations were generated. The "Carlos" passage is listed below in propositional form to graphically clarify formation of an interpretation.

(CLEAR (SIGN(THOUGHT(CARLOS))))
(TIME*(WAIT(CARLOS)))
(DIRECTION(SIGN(MISUNDERSTAND(CARLOS))))
(DISASTER(TIME*(WRONG(MOVE))))
(CAME(CARLOS))(REASON (TIME*(LEARN (CARLOS)))))

(PLACE (PEOPLE(BOTHER))(SLOW)(RESPONSE(CARLOS)))))

(TIME*(SIGN(CONFUSE(CARLOS))))

(CONFUSION(NEGATIVE(SHOW (TRY(CARLOS)))))

(FAST(COME)(MANY(SIGN))(CONFUSE(CARLOS)))

(TIME*(ONE(SIGN(COME))))

(SHAPE(SIGN(RECOGNIZE(CARLOS))))

(DIFFERENT(POSITION(SIGN)))

(TIME*(ACT(CARLOS)))

(TROUBLE(CARLOS))

(NEGATIVE(ACT(CARLOS)))

(ANGRY(PLACE*(PEOPLE)))

(ACT(CARLOS))(DECIDE(CARLOS)))

(SLOW)(CAUTIOUS)(MOVE(CARLOS))

(NERVOUS(PLACE*(PEOPLE)))

(MISTAKE(MAKE(CARLOS)))

In the first proposition, all of the elements are potentially vacant, that is, they have no specific attributes. "Thought" connotes a range of ideas. Throughout the story, the single idea of confusion is reinforced through "waited," "misunderstand", "wrong move" "disaster", "confusion" and so on. "Clear" functions to reinforce the concept of confusion. The decision as how to interpret the passage is made on the attributes of "Carlos" or "sign". For a deaf child "sign" can have multiple meanings therefore one must be selected. For the hearing students however, "sign" has only a single meaning thus

allowing Carlos a primary attribute: foreign. For the hearing-impaired sample, the primary attribute of Carlos was suppressed because these students selected a unique interpretation for "sign". It is the same decision that American linguists make when they interchange "English" and "language".

What such an analysis reveals is that the hearing children probably used the attributes of Carlos as the basis for proceeding with constructing an interpretive net. Some common assumptions about foreigners would be that they would be confused by the language, that they would hesitate in new situations, and that they would be concerned about other persons' reactions to them. What makes the situation ambiguous is that the same assumptions could be made about a child in a sign language class. The open slots such as "here" or "people" or "fast signs" could be filled with "classroom" or "street"; "classmates" or "strangers"; "manual signs" or "blinking lights."

Throughout the passage, there is a consistent propositional structure: (predicate(sign(intellectual state(Carlos))). There are six propositions within the structure of the passage that have this structure. At each proposition, the reader must supply an interpretation for the two terms: "Carlos" and "sign." Since the other two terms are open, the particular circumstances of the proposition restrict the interpretation to the subjective limit of the respondent's personal system. The mechanism

of the interpretation of the passage is such that once an individual supplies a high probability interpretation, for one of the open terms, this interpretation is consistently applied throughout the rest of the passage.

There is a second set of open propositions within the passage that have a structure of: (emotional state (be(place(people)}). This is a more limited frame in that the only possible open interpretation is that for (people). The reader is constrained in the possible interpretation by the fact that the other terms are specified more clearly. The (people) interpretation is contingent upon the interpretation of the other common propositional structure mentioned above. For the deaf reader, manual signs occur in only two primary contexts: with other deaf people in social contexts or with deaf and non-deaf in classrooms. Since a deaf individual is less likely to experience emotional distress when in the presence of other deaf individuals than in the presence of non-deaf or deaf learning to sign, the most appropriate interpretation is that of the classroom.

Implications

This research was an operational demonstration of the principle of active prose interpretation. Perhaps of greater importance, this study provides an example of a prose interpretation as well as an example of a particular case of differential information processing which is

primarily related to experiential factors. What is, therefore, needed is future research that will identify generic categories of experience that can/will affect prose comprehension. An important issue which must be answered by future research on instruction is the determination of whether a lack of information about the world (or a specific subset of experiences) greatly impedes a child's acquisition of new knowledge. Differential reading abilities of adults, as well as children, may not be due to linguistic differences but to the fact that a lifetime of different or incomplete experiences has not prepared them to organize the world in an optional fashion.

APPENDIX

Appendix

Analysis of Variance for Foreigner Interpretation

Source	Sum of Squares	DF	Mean Square	F	Signif of F
Hearing Loss	68.523	1	68.523	7.947	0.008
Sex	2.083	1	2.083	0.242	0.626
Race	7.769	1	7.769	0.901	0.350
HL X Sex	0.042	1	0.042	0.005	0.945
HL X Race	9.661	1	9.661	1.120	0.298
Sex x Race	12.052	1	12.052	1.398	0.246
HL X Sex S Race	6.803	1	6.803	0.789	0.381
Residual	275.908	32	8.622		
Total	398.975	39	10.230		

Analysis of Variance for Sign Language Interpretation

Source	Sum of Squares	DF	Mean Square	F	Signif of F
Hearing Loss	58.151	1	58.151	6.079	0.019
Sex	1.826	1	1.826	0.191	0.665
Race	10.478	1	10.478	1.095	0.303
HL X Sex	1.870	1	1.870	0.195	0.661
HL X Race	0.321	1	0.321	0.034	0.856
Sex X Race	10.646	1	10.646	1.113	0.299
HL X Sex X Race	6.481	1	6.481	0.677	0.417
Residual	306.125	32	9.566		
Total	414.775	39	10.635		

Analysis of Variance for Music Interpretation

Source	Sum of Squares	DF	Mean Square	F	Signif Of F
Hearing Loss	1.611	1	1.611	0.279	0.601
Sex	17.130	1	17.130	2.964	0.095
Race	8.039	1	8.039	1.391	0.247
HL X Sex	4.681	1	4.681	0.810	0.375
HL X Race	5.124	1	5.124	0.886	0.353
Sex x Race	5.999	1	5.999	1.038	0.316
HL X Sex X Race	5.502	1	5.502	0.952	0.337
Residual	184.975	32	5.780		
Total	235.975	39	6.051		

Analysis of Variance for Cards Interpretation

Source	Sum of Squares	DF	Mean Square	F	Signif of F
Hearing Loss	0.009	1	0.009	0.002	0.969
Sex	1.492	1	1.492	0.253	0.618
Race	0.456	1	0.456	0.077	0.783
HL X Sex	3.242	1	3.242	0.550	0.464
HL X Race	3.612	1	3.612	0.613	0.439
Sex X Race	3.650	1	3.650	0.620	0.437
HL X Sex X Race	2.368	1	2.368	0.402	0.531
Residual	188.500	32	5.891		
Total	206.375	39	5.292		

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